



Biodiversity documentation and taxonomy



An arboretum for the endemic and endangered flora of the Nilgiri Biosphere Reserve at Anaikatti, Coimbatore, Tamil Nadu, India.

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ABSTRACT

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Nilgiri Biosphere Reserve (NBR) glorified with its rich diversified ecosystem forms a part of World Network of Biosphere Reserves. NBR with a total area of 5,520 km² spreads across three states including Tamil Nadu, Karnataka, and Kerala. The reserve encompasses a diversified vegetation type including montane rain forest, semi-evergreen moist forest, thorn forest and scrub, montane grassland, and high-elevation, Shola forests. Nilgiri Biosphere Nature Park (NBNP) was formed with the view of "ecosystem services" and as an interpretation center for the diversified forest ecosystem in 70 acres within the reserve. An arboretum was formed at NBNP which is a unique attempt to conserve Rare, Endemic and Threatened (RET) plant species of NBR. A total of 77 species belonging to 44 families were added, of which 26 species were endemic, 44 species endangered and 7 critically endangered were enumerated during our study in 2004-2006. Among the 77 species, 22 species propagated successfully and 61 species of 280 plants were planted and well established in the NBR arboretum. The plants material constitutes 503 plants, 12,244 seeds, and 604 cuttings. Critically endangered species such as *Decalepis hamiltonii*, *Nilgirianthus ciliatus* and *Garcinia talbottii* were successfully reared. Endemic species such as *Schefflera rostrata*, *Cryptocarya stocksii* and *Elaeocarpus tuberculatus*; endangered plants such as *Toxocarpus beddomei* and *Aristolochia tagala* were also propagated. The main conservation implications of this park through *ex-situ* conservation are to provide insurance against catastrophic events. The other objective includes promoting awareness about conservation of the endemic and endangered flora of the Nilgiri Biosphere Reserve among students and public through this arboretum.

1. Introduction

The Nilgiri Biosphere Nature Park (NBNP), was established in 1992 and is located at Anaikatti, 30 km west of Coimbatore, Tamil Nadu, Southern India, occupying an area of 70 acres at an altitude of 650 meters (11° 6' N, 76° 45'E). Different vegetation types to simulate the forest types found in the Nilgiri Biosphere Reserve (NBR), Western Ghats, India was the major task of NBNP and

focusing on the conservation of its flora and fauna, thus functioning as an interpretation center for the NBR (Ashraf, 2000., Walker *et al.*, 1999 and 2004). The nature park focusing conservation of local biodiversity includes invertebrates, fishes, birds and amphibians of the Anaikatti region.

Study Area

The NBNP which forms a part of the NBCP site lies in the rainshadow part of the NBR at an altitude of about 600 metres (MSL) in Thuvaipathy village of Anaikatti (11° 6' N, 76° 45'E), about 30 km from Coimbatore. The proposed 250 acres site

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constitutes a part of the large two square kilometre catchment area. The site lies juxtaposed to the Perinaickenpalayam Reserve Forest on the east. Two hill slopes, northern and southern, also form a part of the zoo. The hills elevate to 80 to 120 metres from the valleys. The vegetation type in the adjoining Reserve Forest could be considered as an intermix of Thorn and Dry Deciduous forest species, which is typical of the forest in Nilgiri Eastern Slopes. The pictorial representation of the study area is depicted in Fig.1.

Objectives:

- (a) Establishment of 100 Endemic and Endangered plants of Nilgiri Biosphere Reserve (NBR);
- (b) Functioning as an Interpretation Center for plant identification, conservation and potentials utilitarian values.

2. Methods

A list of 100 RET plants was prepared with the expertise from Botanical Survey of India, Coimbatore Circle. Based on the list and literature (Ravikumar and Ved, 2000) area of distribution and locality was identified. Collections of plant material vary from species to species. Fallen fruits and regenerated seedlings of *Dipterocarpus indicus*,

Semecarpus travanocricum, *Canarium strictum*, *Elaeocarpus tuberculatus*, *Elaeocarpus munronii* and *Entada rheedii* were collected. Some wing type seed and wind floating seeds are collected. Classical examples are climber species such as *Aristolochia tagala* and *Toxocarpus beddomei* from Gurukala Botanical Sanctuary, Waynad. Cuttings of *Ficus beddomei*, *Nilgirianthus* sp., and *Begonia* sp. and rhizome of *Dioscorea oppositifolia*, *Oclandra wightii* are notable.

Propagation methodology

Indigenous methods of germination of seeds and clone propagation of cutting were followed in the nursery practices. Pre-treatment such as hot water and cold-water soak, cow dung, diluted HCL acid was used for seed coat deteriorating and breaking the dormancy of seed. Seeds are germinated in mother beds (1m X4mX.25m) these beds are used for temporary physical support of the germination. Watering has been done periodically to avoid damping conditions. Once secondary leaves produce the young seedlings taken out from the mother bed and transferred to soil filled poly bag (13 X 25cm.). The pricked out seedlings has been kept under 75% shades for 1-3weeks. After that seedlings shifted to hardening chamber and irrigation is carefully observed to avoid wilting.

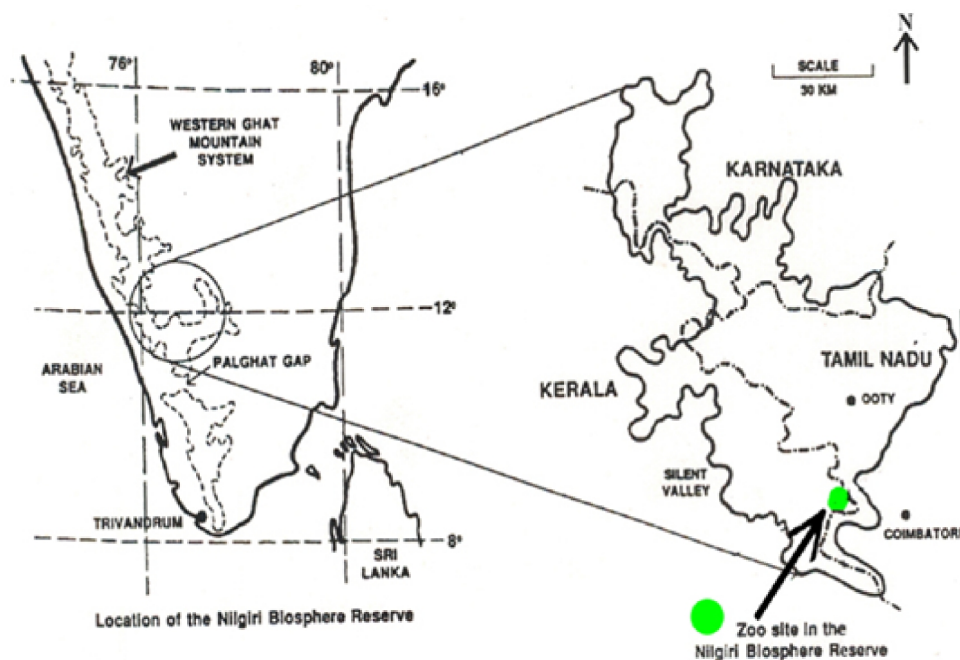


Fig.1. Representation of study area.

Planting

Preferably taller seedling was opted for planting; this is to avoid frequent mortality of sapling. Such saplings are grown in big plastic carboys (20 x 30 cm. x 300 gauge). Transport of such carboys plant in the field is using iron made turtle. Pits (size 1.5X1.5X1.5feet) were dug at spacing of 10X10 feet. Before planting, the pit was filled with decomposed coir pith, sand, red soil, and farmyard manure in on ratio of 1:2:2:2. Microclimate and shade was provided using the fast growing species of *Glyceria sepium* and *Commiphora caudata*. For natural biological nitrogen (BN) fixation, we are planted *Crotalaria pallida*. Before planting the RET species, height of the plant was recorded for monitoring the rate of growth. Regular watering, mulching and rainwater stagnant soil work has done periodically for all the plants and integrated pest management for the affected plants.

3. Results and discussion

Establishment of 100 endemic and endangered plants of NBR was the prime objective of the project. During the project period we were able to collect 77 species of RET plants from the NBR region, with the support of Botanical Survey of India, Southern Circle, Coimbatore, local Forest Department and NGO's we were able to achieve this target successfully. The second objective of standardization of the nursery techniques for RET plants was carried out for 22 species. The third objective of functioning as an interpretation center for plant identification, conservation and utilitarian values was fulfilled through organizing awareness

programmes and a total of 7000 participants were benefited during the project period and post project period. The establishment of arboretum for restoration of the ecosystem and the project site before restoration was represented in Fig.2A & 2B.

Of the 77 species obtained from Govt. and Non Govt. Organizations 61 species of 280 plants planted in the NBR arboretum and well established in the field. Most of the plants show their natural characteristic features like typical seed dispersal of *Toxocarpus beddomei*, Butterflies attracted by the host plant of *Crotalaria longipes*, gregarious flowering of *Nilgirianthus* spp. Foliage special of *Canarium strictum* *Vepris bilocularis* and *Polyalthia rufescens*. Five examples are detailed below.

1. *Ficus beddomei* King (Moraceae): An endemic fig is facing threat due to habitat destruction. Botanical interest fig species, leaves are fascinated and attract due its pink mixed colour. Propagation through cuttings are attempted.
2. *Hydnocarpus pentandra* (Buch-Ham.) Oken (Flacourtiaceae): An endemic tree found very often on stream and reverine areas. A potential carbon sequestration tree, significant role in forest soil organic humus produces for micro-organism.
3. *Crotalaria longipes* Wight & Arn. (Fabaceae): An endemic large shrub found on high altitudes forests. This particular plant collected from the Peak Mountains of the Dotabetta forests Nilgiris. Collection based on phytogeographical and botanical interest species.



Fig. 2A. Project site before restoration in 1992.



Fig. 2B. Project site after restoration in 2010.

4. *Elaeocarpus serratus* L. (Elaeocarpaceae): Endemic & Endangered Tree. Seeds were collected from Manjur Nilgiri Hills.

5. *Thunbergia mysorensis* T. And. (Acanthaceae): This beautiful flowering climber largely collected for Ornamental purpose. This endangered plant cuttings were collected from the hanging climber at Mukkali forests.

During the study period unique flowering species of *Strobilanthes kunthianus*, *Nilgiranthus foliosus* and *Nilgiranthus ciliatus* was recorded in Niligiir, Siruvani and Anaikatty areas. Ecologists believe that gregarious flowering period is a unique nature phenomenon, and occurs due to specific traits, even though, it has occurred in a fragmented population at the same period. Collection and storage of viable seeds would be helpful to conserving these species from catastrophic. If the habitat were left undisturbed, the next flowering would be seen after a period of 10-12 years.

GSPC Target 14 emphasizes the importance of plant diversity and the need for its conservation incorporated into communication, educational and public awareness programmes. A total of 27 awareness programmes were conducted in collaboration with other institutes such as Zoo Outreach Organization (ZOO), Center for Environment Education (CEE) Tamil Nadu, GRG Institutions, Coimbatore, GTR High School, Anaikatty, few colleges in and around Coimbatore and Tamil Nadu Forest Dept. The programmes include lectures, nature trail, quiz programmes and other field oriented events. The value of the endemic and endangered plants in the Nilgiri Biosphere Reserve was highlighted during this occasion. The programme supported with plants for life educational packets sponsored by ZOO/BGCI/Chester Zoo. The target audience comprised local school students and teachers, city school and college students, teachers, public, industrialist, research people and forestry personnel. Most of the targets groups were school and college students (87%), followed by teachers (8%) forest trainees (2%) and others (3%). A total of 2620 participants belonging to 16 institutions were benefited through these programmes.

Through the BGCI/NBRI - IIN-India sponsored project, we could able to implement the few of the GSPC Targets and CBD:

1. *Target 2* – Through the filed survey preliminary assessment of 77 Rare, Endemic and Threatened (RET) species at regional level.
2. *Target 14* - The importance of plant diversity and the need for its conservation incorporated into communication, educational and public awareness programmes. A total of 7000 people trained during the project period and post project period.
3. *Target 16* - Networks for plants conservation activities established at regional, national and international levels. A total of 12 botanical gardens visited by the project staff to acquire more knowledge, sharing of information and exchange of plant materials.
4. *Article 9*- NBNP maintaining 61 species of tree species 9 species of shrubs and 7 species of climbers. The maintenance of 77 species by botanic garden supports the implementation of the Convention on Biological Diversity (CBD, 2000).

4. References

- Ashraf., N.V.K. 2000. The Botanical side of a Zoological Park in Coimbatore, India. *Zoos'Print Journal* 15(1): 191-196.
- Ravikumar, K and Ved, D.K. 2000. 100 Red listed medicinal plants of conservation concern in Southern India. Published by FRLHT, Bangalore. PP 467.
- Walker, S., Ashraf, N.V.K., Rathinasabapathy, B., Gupta, B.K. and Pal, A. 1999. The Nilgiri Biosphere Conservation Park: Biodiversity conservation for the 21st Century. In Plowmann, A.B. and Stevens, P.M.C. Whitely (eds). *Proceedings of the 5th International Zoo Design*. Wildlife Conservation Trust.
- Walker, S., Pal, A., Rathinasabapathy, B. and Manickam, R. 2004. Indian zoological and botanical gardens: Historical perspective and a way forward. *Roots* 1(2): 19-23.